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FAO PLANT PROTECTION BULLETIN

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A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

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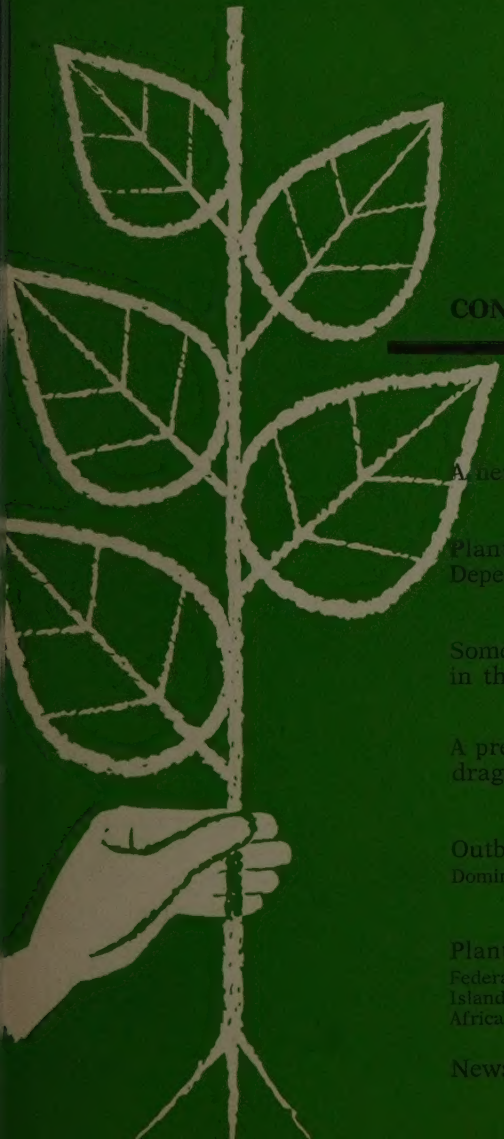

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FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

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PLANT EXPLORATION, COLLECTION AND INTRODUCTION

The requirements of an ever-increasing world population have created a pressing need for the introduction of new plant material which might offer possibilities of crop and grassland improvement. In view of this need, some countries have already taken steps to deal with this problem, while others have voiced an interest in trying to resolve it on a national or international basis.

This study, in reviewing briefly the botanical history of some representative economic plants, presents various timely views on a co-ordinated scientific approach to the exploration, collection and introduction of new plant material, and presents suggestions as to how international organizations might help provide such co-ordination, as well as the technical guidance necessary to ensure its success.

As stated in the foreword to the publication, "*this study indicates the need for a reassessment of the biological and genetical bases of plant introduction, perhaps also a revision or at least a consideration of Vavilov's centres of origin or centres of maximum variability, and certainly the development of more efficient and scientific methods of conducting exploration and collections ...*".

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FAO PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

A New Locust Invasion in Venezuela

by *R. Guagliumi,* Centro de Investigaciones Agronómicas, Ministerio de Agricultura y Cría, Caracas

No invasion of the migratory South American locust (*Schistocerca paranensis* Burm.) has been reported in Venezuela during the last 40 years. Limited invasions of *Tropidacris latreillci* Perty have caused some concern and small outbreaks of *Schistocerca impleta* Walk., *Bucrates capitata* Deg. and *Nastonotus reductus* Br. occurred, but caused no more damage than other major pests which frequently attack agricultural crops of the country.

In April 1958 a severe locust invasion was reported in the savannas north of the Capanaparo river in the state of Apure and according to the information received by the Ministry of Agriculture the locust swarms had been advancing slowly northward during the previous three years, traversing canyons and rivers on their way. As the first reports of these migratory locusts were received only recently, it was thought that the local guides of the area might have exaggerated the importance of the invasion and that perhaps only localized locust outbreaks were involved. However, a survey made from 15 to 17 April in the area between the rivers Cunaviche and Capanaparo showed that the reports were justified. Huge swarms of winged locusts were found concentrated on vast but isolated patches of ground. The swarms moved slowly but did not fly, feeding on the grasses of the savanna, leaving only their roots on the leaves of the few brushes and trees in the savanna and on the forests along the canyons.

Examination of a few specimens showed that this locust was not *Schistocerca paranensis* nor any other well-known species in Venezuela. This locust is smaller than *S. paranensis* and the tibia of the hind legs has a characteristic pink and blue color. It was clear that this species was seldom found in Venezuela and that it was not only a new locust invasion but also a new pest which deserved special attention and investigation. Specimens sent to the Anti-locust Research Centre in London were identified by Dr. V.M. Dirsh as *Rhammatocerus viatorius* Saussure, an insect that has not been recorded previously as a serious plant pest or as a migratory locust.

According to information collected during the survey from the villagers and farmers, and especially from the guides looking after the cattle in the pastures of the state of Apure, these locusts were first observed three to four years earlier in various localities near the Colombian border, through which they probably entered Venezuela. Since then they increased in number and advanced northward, covering a larger area and inflicting more damage every year. In addition to the region between the rivers Capanaparo and Cunaviche, the savannas of Elorza-Arichuna and of Santa Rosa seem also to be infested, and small infestations have been reported near Puerto Ayacucho and elsewhere.

The main damage caused by these locusts is the destruction of grassland, but during August and September a secondary but characteristic effect was the rendering of the meat and milk of the grazing cattle fetid and unpalatable, due to the large numbers of locusts and hoppers

eaten by the cattle directly or while grazing. Fortunately, this secondary effect is only temporary and disappears during the dry season when the locusts are less numerous.

The damage caused to the grassland has until now had little effect on cattle raising, due to the large areas available for grazing and to the rapid recovery of the grass after the rains. The cattle breeders believe, however, that if the locust continues to multiply and extend its invasion area to the north, and if it is not checked by natural factors or control measures, sooner or later a huge locust invasion might occur, causing severe destruction of vegetative growth as it passes. The damage will then be comparable to what is experienced in other countries with migratory locusts, or to what happened in Venezuela about 40 years ago, when locusts invaded the whole eastern part of the country and British Guiana, destroying on their way the basic crops of the population.

The potential danger of this new locust outbreak is well appreciated and it is of outstanding importance, as the actual distribution area is only 150 kilometers distant from the new Guarico Irrigation Scheme, the future success of which is now being threatened by this plague.

Plant Diseases in the British Colonial Dependencies[1]

by *J. C. F. Hopkins,* Commonwealth Mycological Institute, Kew, England

Aden

Further investigation of the "Abyan root-rot" of cotton has revealed the complicated nature of the disease, which is associated with certain soil conditions and the presence of *Pseudomonas solanacearum* f. *asciaticum,* in addition to such fungi as *Macrophomina phaseoli* and *Rhizoctonia* spp. A rise in the water table may also be implicated. Research has now been directed toward the soil conditions of the rhizosphere.

British Cameroons

Satisfactory control of banana leaf spot (*Mycosphaerella musicola*) has been obtained by the use of a 60:40 percent oil/water emulsion, which remains unbroken for 20 minutes (the time required to spray one tankful) after shaking, applied from a 75 cc. Kiekens machine at a dosage of 1 gallon per acre. The use of water as an adjuvant reduced phytotoxicity, while at the same time providing sufficient volume to ensure efficient coverage.

Mauritius

Two pathogens of tobacco were newly recorded, namely *Colletotrichum tabacum* in seed beds and *Phyllosticta* sp. in plantations. The latter caused much damage following cyclones.

A further new record was of a gemma-producing fungus which caused severe defoliation of tea seedlings at Curepipe. It is probably the same as that recorded by Wallace.[2] It has not been encountered in tea plantations and is not considered to be dangerous.

Nigeria

A newly observed disease of sorghum, characterized by small spherical and elongated galls on the leaf veins, accompanied by a shortening of the stem internodes and a consequent dwarfing of the plant, is under investigation. No causal pathogen or insect has been detected, but the superficial resemblance of the symptoms to those of Fiji disease of sugar cane and the presence of cell inclusions suggest a virus origin. Transmission has not as yet been accomplished.

Nyasaland

Colletotrichum tabacum has also been newly recorded on tobacco in this territory, and there is strong circumstantial evidence to suggest that it was imported on seed from Southern Rhodesia. It has been destructive in seed beds and is regarded as a serious menace to the large fire-cured industry, which is mainly supported by African growers. *Septomyxa affinis* was also unusually destructive in seed beds, even causing total loss. Turkish tobacco was particularly susceptible.

The "stem-pitting" disease of coffee recently reported from Tanganyika (*Commw. phytopath. News* 3:29, 1957) was observed on a small number of bushes imported from that territory three years ago. The affected bushes yielded poorly and have been destroyed. The disease does not appear to have spread.

Sierra Leone

A swollen shoot type of virus has been reported on cacao from Gandorhun. It causes vein chlorosis but no swelling of the shoot, has been transmitted to healthy seedlings by mealybugs and grafting at the West African Cocoa Research Institute, Ghana, but is mild in its effects. Dis-

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1 This report covers the period from 1 July 1957 to 30 June 1958.

2 Wallace G. B. 1949. Defoliation of crops by a gemmiferous fungus. *E. Afr. Agr. Jour.* 14:141-143.

eased trees are reported to be "heavy with pods." The virus has been named the Gandorhun virus.

Tanganyika

Tobacco anthracnose (*Colletotrichum tabacum*) has also been newly recorded here and is at present confined to Urambo and Chunya, where the Hicks variety imported from Southern Rhodesia is grown. Zineb sprays regularly applied have given excellent control. The Southern Highlands tobacco area is reported to be free from the disease.

Uganda

The first ratoon crop of sugar cane from setts heat-treated against the ratoon stunting virus has now been harvested free from infection and distributed as planting material to estates.

Some Important Developments in Plant Diseases in the United States in 1957[1]

by *Hilde McGrath* and *Paul R. Miller,* Crops Research Division, Agricultural Research Service, United States Department of Agriculture

Witchweed on maize

Witchweed, *Striga asiatica* (L.) Kuntze, the phanerogamic parasite of maize roots, was found in additional limited areas of North and South Carolina during the 1957 growing season. This rather small, flowering seed plant has been known to parasitize many species of cultivated and wild grasses in tropical and subtropical countries of the Eastern Hemisphere, and it was found for the first time in the Western Hemisphere in the summer of 1956 in maize fields in widely scattered areas in four counties in southeastern North Carolina and in several adjoining countries in South Carolina. Today the pest is still confined to these two states but now encompasses 12 counties in North Carolina, with an acreage of about 265,389, and six counties in South Carolina, with about 112,567 acres affected. Witchweed can attack most grasses, including sugar cane and rice, and in South Africa it attacks maize and sorghum very severely.

Control of this weed is difficult because the host plant is parasitized on the roots by the germinating witchweed seeds, which may lie dormant in the soil for possibly as long as 20 years and still remain viable. One witchweed plant may produce up to one-half million exceedingly tiny seeds.

Host plants of *Striga* exude a substance from their roots that stimulates the witchweed seeds to germinate. The germinating seed gives rise to haustoria, which fasten themselves to the roots of host plants and establish a linkage of the vascular systems of the two plants, thus permitting the parasite to obtain its nourishment from the host for a period of about a month, while the witchweed is still subterranean. After emergence, the witchweed plant becomes bright green and begins to manufacture its own food, although it still depends upon its host for water and minerals. Damage to host plants begins prior to witchweed emergence and continues throughout the life cycle of the weed. Host plants appear to be suffering from acute drought, manifested by stunting, wilting and yellowing. Severely parasitized maize plants may die, but even if the host remains alive, there is a reduction in both quality and yield of the grain.

The first step in preventing the spread of witchweed has been the establishment of federal and state quarantines prohibiting the transport of seed from infested to clean areas with soil, vegetables, farm equipment, and so forth.

The Weed Control In Crops Section, Crops Protection Research Branch, United States Department of Agriculture, has initiated research on the control of witchweed, in co-operation with the North and South Carolina Agricultural Experiment Stations. Intensive investigation of cultural, chemical and combination methods of control is being conducted at Whiteville, North Carolina. Combination practices involving crop rotations and herbicide treatments have shown the greatest promise in controlling this pest.

Witchweed is undoubtedly the most potentially serious pest of maize in the United States at the present time.

Hoja blanca of rice

In September 1957, a disease of rice that was new to the United States was discovered and identified at the Belle Glade Experiment

1 The above report has been adapted primarily from recently published material.

Station of the U.S. Department of Agriculture in Florida. This disease, reported previously from Cuba, Venezuela, Panama and Costa Rica, is characterized by the appearance of yellowish-white stripes on the leaf blade, whitening of the entire leaf, or a mosaic mottling effect of the leaf, and often the failure of the plant to produce heads. Yields may be reduced from 25 to 50 percent.

Hoja blanca, which is believed to be caused by an insect-transmitted virus, was also widespread in 1957 in commercial rice fields of varieties Bluebonnet 50, Zenith, Rexoro, Early Prolific and some other local varieties in the rice-growing areas of the Cauca Valley and Tolima in Colombia. Red rice was found to be very susceptible and disease incidence was highest in late-seeded rice. In Colombia the disease apparently is not new, since it was seen and described there as early as 1935. However, the disease is cyclic in occurrence, and only on a few occasions in the past has it caused enough damage in Colombia to be noticeable.

In Cuba the disease first appeared in 1954 and by 1956 was causing severe losses in the two most commonly grown United States varieties, Bluebonnet 50 and Century Patna 231.

In the hoja blanca nurseries in Cuba and Venezuela, reactions to the disease of many U.S. rice varieties, selections and introductions, were determined in 1957. All of the long- and short-grain varieties more widely grown in the United States were susceptible. Several minor short- and medium-grain varieties were resistant or moderately resistant. Also, some long-grain varieties, which were undesirable types, were found to have some resistance — a characteristic which apparently originates from their short-grain parentage. Most of the varieties showing resistance were introduced from Japan, China and Formosa. As a result of these trials, it is expected that continued breeding work will eventually produce resistant strains of all grain types of rice.

In the Belle Glade area of Florida a number of grass weeds that are commonly found growing in association with rice in the south, have been found to exhibit symptoms similar to those of hoja blanca on rice. *Echinochloa crusgalli*, *E. colonum*, *E. walteri*, *Brachiaria plantaginea*, *Panicum capillare*, *Oryza sativa* (var. red. rice) and, particularly, *Sacciolepis striata*, may serve as hosts to perpetuate and spread the disease, with or without the presence of rice. The last-named grass, which has displayed the most prominent symptoms of hoja blanca, is a promising weed for cross-inoculation studies to determine the virus nature of the disease in rice.

Although rice is a relatively unimportant crop in Florida, if hoja blanca were allowed to spread and invade the 1 and ½ million acres of commercial rice in the states of Arkansas, California, Louisiana, Mississippi and Texas, severe losses could occur.

Bakanae disease of rice

Another disease of rice appeared in the United States for the first time in 1957. Rice seedlings scattered through rice fields at the Rice Pasture Experiment Station, Beaumont, Texas, showed symptoms of abnormal leaf elongation, bending over of the longest leaves or of the whole plant, moderate chlorosis and some browning or necrosis of the roots. Diseased plants were about twice the height of normal ones but incidence was only a trace. These symptoms resemble those of the bakanae disease of rice in Japan, caused by the fungus *Gibberella fujikuroi* (Saw.) Wr. (=*Fusarium moniliforme*). A disease of rice that has recently spread widely in Italy is caused by the same organism, but it is known in that country as rice foot-rot and was first reported in 1938.

In the United States, isolates of *Fusarium* sp. have been regularly obtained from necrotic rice tissues and some of those isolates appeared to be *Fusarium moniliforme*. Tests were conducted to study the possible stimulatory effect of cultures of the fungus on the growth habit of rice. In most cases such cultures stimulated plant growth, indicating further that the fungus involved probably contained gibberellic acid or a similar stimulating substance and was therefore probably the same organism causing the bakanae disease in Japan. In some cases, however, the cultural filtrates were inhibitory to plant growth.

This new disease is of minor importance in the southern rice area of the United States. It seems probable that strains of *Fusarium moniliforme* capable of causing the bakanae disease have been present for years, but the disease either has been overlooked in the past or favorable environmental conditions for disease development have not often existed.

Stripe rust of wheat

The cereal rust pattern in the United States in 1957 was complicated somewhat by the appearance over a large portion of the wheat belt of stripe rust, *Puccinia glumarum* Eriks. & E. Henn. (=*P. striiformis* West.), a cool weather rust found mostly in mountainous or seacoast locations, such as the intermountain sections of the Pacific Northwest and high elevation areas in Mexico. Stripe rust usually does not develop in the Great Plains wheat belt region of the United States because of unfavorable climatic conditions, but abundant rainfall, cool temperatures, and high humidity in Texas during the wheat-growing season, resulted in conditions ideal for its development and spread. In the past, stripe rust has been reported from Arizona, California, Colorado, Idaho, Montana, Oregon, South Dakota, Texas, Utah, Washington and Wyoming. In Texas the disease was reported previously in trace amounts in 1941, 1953 and 1956, but 1957 marks the first year since epidemiology studies were begun that it spread widely along the path of the other rusts of winter wheat. It was found first in a local area near Vernon, Texas, and later was reported in the central part of the state and in the northern panhandle.

This was the first year that stripe rust was reported in Oklahoma. It was observed about 1 June near Stillwater and later was found generally distributed over the state, particularly in the western section, but not in damaging quantity. Severity was seldom over 1 percent. The presence of stripe rust in Oklahoma was attributed to the abnormally cool and wet weather over the entire Southern Plains area during the entire four-month spring period.

Stripe rust occurred for what is believed to be the first time in Kansas, in three counties in the northwestern part of the state, mostly on irrigated wheat, in two counties in central Kansas, and in the north-central part of the state in late May. It was also found in an occasional field in southwestern Kansas but none was found in the northeast. Collections were made in 17 counties and the disease was reported in several more counties.

In Nebraska stripe rust was discovered first in the southeast, in agronomy test plots at Lincoln during the first and second weeks in June, and then at York. Later it was found near North Platte in western Nebraska and several other localities southwest of there. It is probable that the disease was present in trace amounts throughout the state.

Collections of stripe rust were made in the southwestern part of South Dakota, at Martin, and in the east-central part, at Brookings, during the first week in July, on winter wheat. Later in the season the heavy leaf rust infection made detection of stripe rust difficult.

Wyoming was the sixth and last state to report the presence of stripe rust in 1957. The disease was first noted at Laramie in the middle of July on spring wheat being grown on the agronomy farm. This area is primarily range land and the farm plus a few adjacent locations are the only places where wheat is grown in this part of the state. By the latter part of August stripe rust had reached epidemic proportions on susceptible varieties throughout the farm. The explanation for this unprecedented occurrence is that spring wheat in Laramie is much later than in the surrounding wheat-producing areas and twice normal summer rainfall plus high altitude which insured cool nights were all conducive to intensification of disease spread. The most susceptible variety was Onas.

Stripe rust was neither seen nor reported in Colorado in 1957.

In spite of the fact that stripe rust was considered to be epiphytotic in the wheat belt in 1957, the first such epiphytotic ever reported for this area of the United States, losses resulting were not significant in the over-all rust loss pattern, and in view of its past behavior it is not probable that stripe rust will be a disease of potential seriousness every year.

Soybean cyst nematode

The soybean cyst nematode (*Heterodera glycines* Ichinohe) that causes the disease known as yellow dwarf or the soybean cyst nematode disease, was present in six soybean-growing states of southeastern United States in 1957. This nematode was reported for the first time in the Western Hemisphere in August 1954, attacking soybean plants in southeastern North Carolina. Previously it had been known in Japan (Hokkaido, Honshu) and China (Manchuria).

In the two years after its original discovery, the nematode was found in additional locations, all within two counties in North Carolina. In July 1955, the Plant Pest Control Branch of the Agricultural Research Service, United States Department of Agriculture, considered the pest of such potential importance to soybean production that it sent a letter to 29 of the principal soybean-producing states, to inform them of the presence of this nematode and to alert them to the necessity for making surveys to determine the extent of infestation. In March 1956, the North Carolina State Board of Agriculture imposed a quarantine on infested areas, designated to restrict the movement of soil, machines, plant parts and other such materials that might spread the infestation.

In the latter part of 1956, the soybean cyst nematode was found in Lake County, western Tennessee. This discovery prompted an immediate survey of soybean fields in Missouri in early December. The nematode was found and identified from nine fields in Pemiscott County, which is located across the Mississippi River from the Lake County, Tennessee infestation area. All nine fields were within one to five miles of the river. As a result of finding this nematode in two additional states, the United States Department of Agriculture began to consider the imposition of a quarantine against this pest in the early part of 1957. The quarantines, both federal and state, actually took effect in the summer of 1957.

During 1957 infestation was found in three more states, namely, Arkansas, Kentucky and Mississippi.

Symptoms of the yellow dwarf disease on soybean are stunting, yellowing with chlorosis beginning distally on the foliage, and underdeveloped roots with a few or no nodules. Cysts may be seen easily on diseased roots.

Inasmuch as soybean is an important crop in the United States and this nematode is capable of destroying an entire crop, it is readily apparent that potentially the soybean cyst nematode is extremely dangerous and it could be the limiting factor in soybean production.

Originally soybean was the only plant known to be attacked. However, the known host range has been extended and now includes a number of other legumes, some of which also have economic significance. Among these are annual Kobe (*Lespedeza striata*) and Korean lespedeza (*L. stipulacea*), which are used for hay and seed in 18 states and also as pasture, green manure and cover crop. Another host is common vetch (*Vicia sativa*), which is used as a winter cover crop in some areas and because it grows as a weed along the sides of roads and fencerows, it may serve as an additional host for the nematode in the absence of soybeans. Although snap bean (*Phaseolus vulgaris*) is not a host as favored as soybean and lespedeza, about 300,000 acres of snap beans in 32 states constitute another reason to fear this nematode.

Other hosts reported for the soybean cyst nematode are the following legumes: wild soybean (*Glycine ussuriensis*), *G. gracilis,* Chinese lespedeza (*Lespedeza cuneata*), *Vicia villosa,* adsuki bean (*Phaseolus angularis*), hemp sesbania (*Sesbania macrocarpa*) and white lupine (*Lupinus albus*). Henbit deadnettle (*Lamium amplexicaule*) of the Labiatae family is the only host reported outside the Leguminosae.

A great deal of research already has been carried out with respect to the soybean cyst nematode and a great deal more will be done in an effort to achieve satisfactory control in addition to quarantine. Past work included rotation tests, soil fumigation trials and studies on resistance. By screening approximately 3,000 soybean varieties and selections, four lines have recently been found to show resistance to the nematode. The reproduction and multiplication of the nematode were apparently limited in the resistant

lines and the second-stage larvae failed to mature in their roots. These findings mark a beginning in the development of nematode-resistant soybeans from the existing germ plasm.

A new virus of potato

A new potato disease was observed in 1957 for the first time, occurring in four fields of potatoes of Kennebec variety in the Salinas Valley, Monterey County, California.

At the time of discovery of the disease, two fields had already been harvested and two were in the process of being harvested. The tops of the plants had died, therefore it was not possible to observe foliage symptoms. Tuber symptoms included shallow necrotic rings and arcs, about 5 to 10 millimeters in diameter, on the surface of the tuber, usually near the distal end, and just beneath the rings dark necrotic tissue that extended as deep as one quarter of an inch into the flesh of the potato. In addition, small necrotic flecks were distributed throughout the tuber but were not connected with the surface lesions.

Tuber symptoms are very similar to symptoms of the potato stem mottle disease in Europe, which is caused by a soil-retained virus. Research has indicated that the new disease is also caused by a virus which is soil-retained. Although the potato stem mottle disease has been reported as showing the small necrotic internal flecking symptoms, the external rings and arcs have not been noted in Europe. Foliage symptoms begin with a mottling of the leaves, and then the appearance of necrotic lesions on leaves, petioles and stems.

Mechanical inoculation tests with sap from diseased tubers, showing necrotic rings to Turkish and Yellow Burley tobaccos, produced on leaves a necrotic mottle and necrotic rings, severe stem necrosis and stunting. In addition, when tobacco was grown in soil from the diseased areas, 12 percent of the plants developed identical symptoms.

Limited serological tests indicate that the disease may be related to the tobacco rattle virus disease that occurs in Europe, as well as having symptoms resembling potato stem mottle, as has already been mentioned.

A virus disease of cotton

In the Lower Rio Grande Valley of Texas, occasional cotton plants bearing virus-like symptoms have been observed during the past five years. Several attempts in 1955 to transmit this suspected virus disease by inoculation with expressed leaf sap from diseased plants all ended in failure.

In 1956, identical symptoms appeared on cotton growing in screenhouses and greenhouses of the U.S. Pink Bollworm Research Center, Brownsville, Texas. Successful transmission of the disease to healthy Empire variety cotton plants was achieved this time by approach grafting. Upon isolation and examination under an electron microscope, the viral agent was found to be composed of spherical particles about 30 mμ in diameter. The virus particles seemed to be associated with or embedded within an unknown proteinaceous substance. The virus is presumably not seed-transmissible, as diseased seed did not produce diseased plants.

In March 1957 a survey was made in the screenhouse and in the Malvaceae Garden of the Pink Bollworm Research Center, to determine the extent of incidence of this new disease. It revealed almost 100 percent infection of Deltapine and Empire cotton in the screenhouse, involving about 5,000 plants. Also infected were six other species of *Gossypium*, six races of *G. hirsutum*, two *Gossypium* crosses, and okra plants (*Hibiscus esculentus*).

Symptoms of the cotton virus disease are manifested in older leaves by the appearance of chlorotic areas at tips of smaller veins and by vein-clearing. Yellowing between veins, vein-banding and mottling follow. In young leaves there is also spotted intervenal yellowing, together with downward cupping; and often leaves display typical mosaic symptoms and puckering. As the disease progresses, chlorophyll breakdown becomes pronounced, red spots appear between the veins, and leaf color gradually

changes to tan. In the final stages, leaf abscission takes place readily. General effects of the virus on the cotton plant are a limited stunting, shortening of terminal internodes, and reduction by a half to two thirds in boll size. The last characteristic is accompanied by small, poorly filled seeds and mottled bracts. Vectors for the disease have not been established.

Although this particular cotton virus disease has not been economically important in the United States, its possible importance in the future deserves attention.

A Preliminary Note on Phytophthora Wilt of Snapdragon in Pakistan[1]

by *Abdul Ghafoor*, Department of Plant Protection, Ministry of Food and Agriculture, Karachi

During the months of December and January snapdragons (*Antirrhinum* sp.) are frequently seen affected with some root disease which causes wilting and subsequently sudden death of plants. Since snapdragons form a sizeable part of spring flowers, an investigation of the disease was initiated under prevailing conditions in Karachi.

A similar disease of snapdragons has been reported from various countries under different common names. The causal fungus was attributed to *Phytophtora parasitica* Dast. in Madagascar (1), Rhodesia (3), South Africa (4) and Mauritius (5), to *P. cactorum* (Leb. & Cohn) Schroet. in the U.S.A. (2) and to *P. pini* var. *antirrhini* Sundar. & Ramakr. in India (6).

Symptoms

The disease is generally noticed on plants which are flowering or about to flower. In early stages of the disease, affected plants show symptoms of sudden water shortage, with tender shoots and growing tips drooping. On older branches and basal leaves it takes a longer time to show disease symptoms. The stem, which is normally light green, becomes blackened and rough at the base. Somewhat dry and sunken dark lesions appear on the stem near the ground level. The discoloration spreads not only on the stem but also slowly toward the root system (Figure 1). The roots gradually show decay, with epidermis and cortical tissues peeled off. The taproot is severely damaged, while smaller roots are more or less completely destroyed. The plants consequently wilt and die.

The causal fungus

The pathogen was isolated from the basal portion of the stem and the main root. It was identified as a species of *Phytophthora.*

In culture, the fungus produces abundant white cottony growth and a small number of piriform and terminal sporangia, measuring 14.5-38.6 μ × 14.5-29.0 μ with an average of 26.1 × 22.74 μ. A large number of sporangia appear when the fungus is placed in fresh water. Such sporangia measure 19.3-50.7 μ × 14.5-38.8 μ, averaging 30.12 × 22.24 μ. The size of sporangia is slightly affected by temperatures and media. Young mycelium, low temperature and dilute nutrient solution are conducive to sporangial formation.

Germination of zoospores is more rapid in 1 percent sucrose or maltose solution as compared with dextrose or lactose solution or plain water. Oospores were not found in culture.

Pathogenicity

Surface-sterilized seeds of snapdragon were sown in sterilized soil inoculated with the culture of fungus in December 1957, when the average temperature was about 75°F. Seeds sown in noninoculated soil were maintained as the control. Soon after germination, seedlings in the inoculated series began to develop damping-off. A high percentage of the seedlings eventually died and from the affected seedlings the fungus was reisolated. Seedlings in the control remained healthy.

In another trial, 1½ to 2-month-old transplanted seedlings were used. Inoculation was made either by adding fungus culture to the base of

1 Contribution No. 5/50 from the Department of Plant Protection, Karachi.

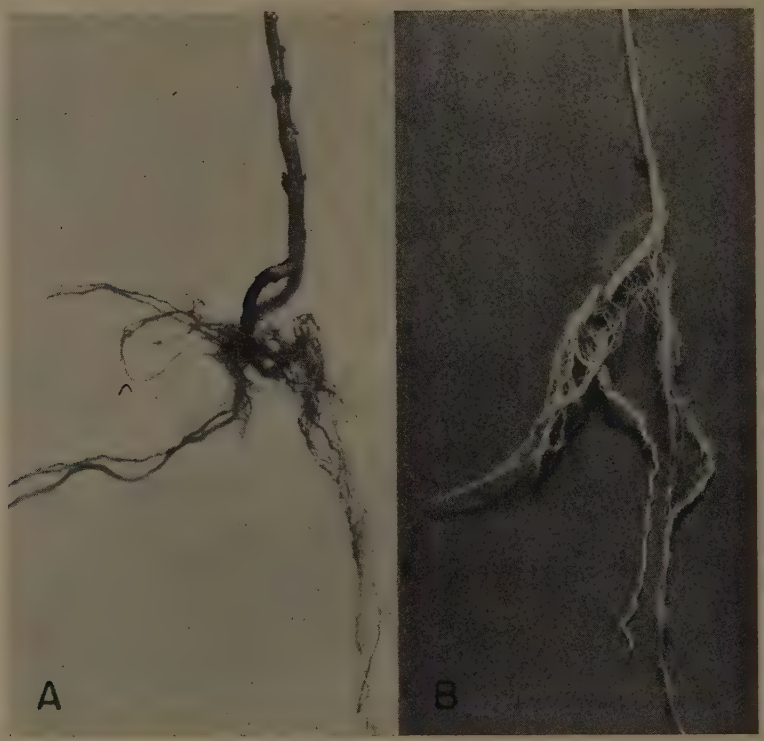

Figure 1. Phytophthora wilt of snapdragon. A. Roots and basal part of a diseased plant showing characteristic blackening. B. Part of a healthy plant.

seedlings soon after the seedlings were established, or by adding into the soil a zoospore suspension which was prepared by placing actively growing mycelium in a large beaker for about 24 hours and adding sterilized water every 5 to 6 hours. Seedlings began to die in about two weeks after inoculation. At the end of the season it was found that both methods of inoculation produced heavy mortality of plants, ranging from 66 to 100 percent, while the disease was absent in the control.

From these preliminary studies, it is obvious that the species of *Phytophthora* isolated from diseased plants of snapdragons is strongly parasitic. Since the species failed to produce oospores, identification could not be made.

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Outbreaks and New Records

by *E. Castellani,* Expanded Technical Assistance Program, FAO, Ciudad Trujillo

DOMINICAN REPUBLIC

OCCURRENCE OF HOJA BLANCA DISEASE OF RICE

The hoja blanca disease was found recently to occur in the Dominican Republic. During a disease survey made in September and October 1958, the disease was observed on upland rice in 20 farms in the Province of Trujillo and on lowland rice in one location each in the Provinces of Santiago, Benefactor and Libertad. Specimens of affected plants were sent to Dr. G. Malaguti, Instituto de Investigaciones Agronómicas, Venezuela, and Dr. C. R. Adair, Crops Research Division, Agricultural Research Service, United States Department of Agriculture; both confirmed the identification.

The disease often occurred only in isolated patches within a field and symptoms were not readily recognizable on mature rice plants. It was therefore rather difficult to detect the disease. Similar symptoms were also found on grasses surrounding affected rice fields. Rice varieties which were observed to be affected by hoja blanca are as follows:

U. S. VARIETIES

Bluebonnet	Toro
Century Patna	

LOCAL VARIETIES

Fidelia	Especial
Santomé	Canilla
Yabacoa	Toño Brea
Lucero	

According to farmers, the disease has been known in the Dominican Republic for more than 20 years but was never before reported. The farmers also stated that the disease was very severe a few years ago but it nearly disappeared later. This appears to coincide with the recent report[1] from Colombia that the hoja blanca disease was seen and recorded as early as 1935. It is probably true that the disease has existed in the American tropics for a number of years, but its sporadic occurrence or cyclic development, together with the difficulty of its detection on mature rice plants, has caused the disease to be overlooked.

The known geographic range of hoja blanca now includes Cuba, Colombia, Costa Rica, Dominican Republic, Florida, Panama and Venezuela. In October 1958 the Caribbean Commission reported that the occurrence of hoja blanca in Surinam was suspected.

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1 GARCÉS-OREJUELA, C., P.R. JENNINGS, and R.L. SNILES. 1958. Hoja blanca of rice and the history of the disease in Colombia. *Plant Dis. Reptr.* 42:750-751.

Plant Quarantine Announcements

FEDERATION OF RHODESIA AND NYASALAND

Plant Pests and Diseases Act, 1958, replaces certain laws previously made under Territorial authorities. It consists of a preliminary part, and the following section:

Part. I. Eradication and prevention of the spread of pests. (This part is not applicable to Nyasaland.)

Part II. Control of the importation of growing media, injurious organisms, invertebrates and plants.

Part III. Special provisions relating to cured tobacco. (This part is not applicable to Nyasaland.)

Part IV. General.

Part II establishes the regulatory powers of the Ministry of Agriculture and the powers of inspectors in relation to the importation of growing medium (including soil), injurious organisms, invertebrates, and plants (whether living or dead, including unmanufactured plant products).

The following Territorial laws and subsidiary legislation are thus repealed:

Plant Protection Act 1942, of South Rhodesia and the subsidiary legislation made thereunder.

Plant Pests and Diseases Ordinance of Northern Rhodesia and the subsidiary legislation made thereunder.

Plant Protection Ordinance of Nyasaland, Section 9, and the subsidiary legislation made under that section.

Plant Protection (Southern Rhodesia) Order 1954.

Plant Pests and Diseases (Northern Rhodesia) Order 1956.

GUERNSEY (Channel Islands)

Statutory Instrument 1958, No. 41, amends further the Plant and Potatoes Importation Order 1953. It prescribes a new form of certificate for apples imported from the United States, certifying that the consignment described is believed to conform with the current phytosanitary regulations of the importing country. It also removes the restrictions in relation to Colorado beetle on the importation of cider apples from the Continent of Europe, the United States and Canada.

Each consignment of apples, apricots, greengages, nectarines, peaches, pears or plums grown in all European countries except Belgium, Denmark, Finland, Luxembourg, the Netherlands, Norway and Sweden must be examined before dispatch and must be found free from San José scale (*Quadraspidiotus perniciosus*) and substantially free from all species of Lepidoptera, including Oriental fruit moth (*Laspeyresia molesta*). Such consignment is required to be accompanied by a prescribed certificate.

MAURITIUS

Importation of Citrus (Restriction) Proclamation of 17 April 1956 (Proclamation No. 6 of 1956), provides that the importation from any place of plants or parts of plants (except fruit and seeds) of all species and varieties of *Citrus* is prohibited except under a permit previously obtained from the Director of Agriculture.

Proclamation No. 11 of 22 August 1958, published in the *Legal Supplement to the Government Gazette of the Colony of Mauritius* No. 56 of 30 August 1958, amends Proclamation No. 1 of 1949. By the amendment, live plants of all sorts and any parts thereof may be imported by sea only if an import permit has been previously obtained from the Director of Agriculture. Permit, however, is not required for the importation by sea of fruits, seeds, vegetables and cut flowers. Proclamation No. 1 of 1949 provides that importation by air of live plants and parts thereof, including fresh fruits (excluding seeds), requires an import permit.

NETHERLANDS

Order No. J. 2391 of 12 September 1958, published in the *Nederlandse Staatscourant* No. 179 of 16 September 1958, governs the importation of tulip bulbs. The importation of tulip bulbs is permitted only if the following requirements are observed:

1. The consignment must be free from infestation by the stem and bulb eelworm (*Ditylenchus dipsaci*).
2. If infestation of tulips by the stem and bulb eelworm has been recorded in the country where the bulbs were grown, the plants from which the bulbs were derived must have been officially examined in the field during growth and found to be free from infestation by this eelworm.
3. The consignment of tulips must be accompanied by a phytosanitary certificate issued by the country where the produce was grown, in the form annexed to the International Plant Protection Convention of 1951.
4. If the exporting country is not the country where the produce was grown, the consignment must be accompanied, in addition to the phytosanitary certificate of the country of origin or an authenticated photocopy of the certificate, by a declaration of the plant protection service of the exporting country to the effect that the consignment is considered still to conform with the Netherlands' phytosanitary requirements.

SWEDEN

The Swedish State Plant Protection Institute has established exemptions from the provisions of current regulations, with regard to the importation of ware potatoes.

Potatoes intended for food may be imported from 1 October 1958 if accompanied by a phytosanitary certificate issued by the country of origin with following additional declarations, stating:

1. location of the field of cultivation;
2. that the potatoes have been found free from wart disease (*Synchytrium endobioticum*), ring rot (*Corynebacterium sepedonicum*), potato root eelworm (*Heterodera rostochiensis*), potato moth (*Phthorimaea operculella*), Japanese beetle (*Popillia japonica*) and Colorado beetle (*Leptinotarsa decemlineata*);
3. that neither potato wart nor potato root eelworm have been recorded at the place of cultivation of within 5 kilometers from that place; that during the last two years no Japanese beetles occurred within 20 kilometers from the place of cultivation and no Colorado beetles within 5 kilometers. (The distance requirement for Colorado beetle may be exempted if it is stated that the packings have been treated with rotenone or that the potatoes have been disinfested by an approved method);
4. that if the sorting and loading points are within 20 kilometers from any place where Colorado beetle has been prevalent during the last two years, the premises and loading room have been disinfested before loading; and
5. that the potatoes are pratically free from soil, packed in new bags or cases, and sealed satisfactorily by the plant protection service concerned.

UNION OF SOUTH AFRICA

Proclamation No. 168 of 9 June 1958, published in the *Government Gazette* Vol. 193, No. 6080, 4 July 1958, amends Proclamation No. 93 of 7 May 1956 (see *FAO Plant Prot. Bull.* 4 : 190-191, 1956), with respect to the importation of cotton packing material. According to this amendment, where second-hand packing material, including hessian, is used to cover imported bales of raw unprocessed cotton, such cotton will be fumigated with methyl bromide in a prescribed manner before release. Exemption from this fumigation requirement for unprocessed raw cotton and second-hand packing may be considered only if the consignment is accompanied and covered by an official certificate, stating that the consignment, including packing material, was fumigated in the country of origin in an acceptable manner.

News and Notes

Toxicity of pesticide residues

A great range of organic synthetic pesticides has come into general use during the last decade. They are characterized by extremely high potency and specific toxicity to pests normally linked with high mammalian toxicity. Thus their widespread adoption as a normal agricultural practice has stressed the need for the utmost caution in avoiding harmful residues on or in harvested products or on pastures. As a result, many governments have enacted legislation to regulate the marketing and use of pesticides for the purpose of preventing hazards, without, at the same time, hindering progress in pest control. In many countries, pesticides must be registered and certified before they are marketed, and must be properly labelled and packed in accordance with regulations. Growers are urged to follow the recommendations given by manufacturers and governmental agents for the safe use of pesticides, especially with regard to the rate and time of application, but such requirements are not enforceable by law because of the many variable factors involved.

A further step in this direction was taken by the governments of the United States and Canada in establishing legal tolerance limits of pesticides on or in various plant products. The main difference between the U.S. and Canadian legislation is that the former covers "raw agricultural products" including forage crops and other animal feeds, whereas the latter is limited to food offered for sale for consumption by human beings.

In Europe, this American venture is being watched with great interest, but except in isolated cases, for instance in the use of parathion for olive fly control, no attempt has been made to establish residue tolerances in a general way. The Sub-Committee of Experts of the Western European Union, at its meeting in Brussels in 1955, suggested maximum tolerable concentrations of residues of some principal pesticides, which in a few cases differed from the levels established in North America. The residue problem was also discussed in late 1957 at a symposium sponsored by the Pesticides Group of the Society of Chemical Industry (United Kingdom), in collaboration with the Association of British Insecticide Manufacturers.

While the need for enforceable legal measures to prevent negligent or ignorant growers from producing food or animal feed containing harmful pesticide residues is well recognized, opinions vary with regard to what extent such requirements should or could be imposed. It has been pointed out that there was no proven case of poisoning of man due to pesticide residues on foodstuff, and that the toxicity of a pesticide to warm-blooded animals may not be necessarily linked with food hazard. There are also many problems in the application and enforcement of such legislation at the extension level. Furthermore, as pesticides are commodities much involved in international trade, manufacturers, encountering a host of regulations and restrictions which vary in different countries, are increasingly apprehensive of the difficulties of developing and introducing new products to the market.

At the recommendation of the European Agricultural Commission and other technical meetings, FAO has been gathering information on legislation in force. It is also proposing to convene a small panel of experts to study various problems relating to the legislative control of the marketing and use of pesticides, especially the establishment of tolerance levels of residues, and to set forth recommendations for reference of interested governments.

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